# How Infrastructure Management Can Facilitate Digital Transformation

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Although towercos are relatively new to the mobile and wireless industries, they are playing an increasingly important role: they are needed to roll out 4G and 5G network upgrades. These sites are complex, and their resources must be properly managed to fulfill their purpose of broadening the reach of mobile networks. A properly managed towerco is capable of not only planning and executing rollouts but also streamlining ongoing operations. As towercos expand their presence and importance in the industry, they need to fully understand what's required to manage tower sites and infrastructure.
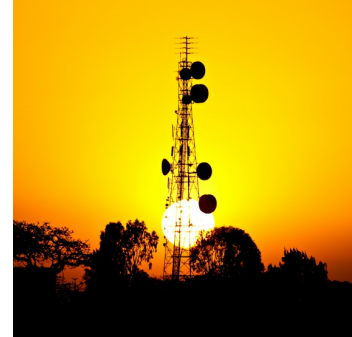
Digital transformation is forcing change, and, like other businesses, towercos must be prepared to adapt as needed. Implementing the right technology at towers today will allow them to accommodate the new requirements of the future. The ability of a towerco to deliver quality service while keeping costs low and customer satisfaction high is completely dependent on how it manages site infrastructure. This will be the key to longevity and profitability in a changing digital world.

Managing Tower Site Information to Streamline Processes

While a tower site and its infrastructure are intertwined, it's wise to look at them separately from an operational perspective. Site management encompasses a broad range of activities, but all share the same basic principle of documentation. The first activity is candidate selection, during which a vast array of diverse information is collected as the towerco researches potential sites. This real estate and facility documentation must be stored in a content management system, similar to how technical information about infrastructure assets and resources is documented. Storing real estate and facility documentation in a software system streamlines decision-making and makes environmental permit tracking actionable. It also makes it possible to ensure planned milestones are hit and to ensure regulatory restrictions are honored.

Once the site is selected, planning and rollout of site infrastructure assets occurs. These activities must be managed properly, and they require a well-structured process flow and coordination between all involved parties and subcontractors. Once a site is operational, ongoing management of its assets and space become a top priority. Each site has many diverse assets to manage, including but not limited to generators, UPS, PDU, CRAC or CRAH air conditioning units, CCTV and access-control devices, poles, rooftops, antennas, radio units, BBU equipment, routers and OTN devices. The only way to keep track of and maintain the functionality of tower assets is to know exactly what you have. That means documenting them in a comprehensive database and having processes to keep the data current at all times.

As towers are multi-user and multi-tenant, it's important for towercos to assign assets and equipment to specific tenants. These assignments should then be documented in the central database. In terms of space, the towerco must know how many racks and cages its site supports, assign them to tenants, and know at any given time how much space is used versus what is available. Space usage diagrams are a beneficial tool for analyzing and reporting on used, free and

reserved space, both in aggregate and by individual tenant. These are only available when there's an underlying database in which the detailed site-specific information is properly documented.

A common theme emerges among these different facets of tower site management: All require a way to keep track of and make specific information actionable. Towercos can borrow principles from data center infrastructure management to address this need. Any DCIM tool relies on a database of documented assets in the facility to manage space, power, cooling and connectivity. What towercos need is a software system that expands this functionality to include all assets, resources and information, across all operational areas. Managing tower site information in such a unified way streamlines all processes. A key feature to look for in a management solution is therefore a single source of truth data repository that crosses operational boundaries.

Industry Connections: Data Centers

Traditionally DCIM is not on the radar of towercos. However, every tower and rooftop needs sufficient power, cooling and space to operate, and these are the fundamentals of DCIM. The ideal towerco management software should therefore have DCIM functionalities that make it possible to efficiently manage the space, power and temperature of towers, similarly to how it manages those elements in a data center. In terms of temperature management, the only difference between towers and data centers is that tower sites are smaller and cooling needs are limited.

Once tower assets and resources are documented within a central data repository, users will then be able to view the tower's as-is space usage in various graphical representations—and see at a glance what space is being used, what is committed, and what is available. If power cabling and circuit breakers are also documented in the database, towercos will also have information about provisioned versus consumed power and power capacity readily available. The ability to monitor power consumption per tenant is also key to determine pricing and ensuring SLAs are met.

Learning from Edge Data Centers

The tower infrastructure is the convergence of many elements: the tower, edge small cells, fiber and power cabling and data center infrastructure. When you consider tower infrastructure from this perspective, it makes sense to reframe managing it to align with that of an edge data center.

Towers are becoming more prevalent because they are necessary for mobile edge computing. Service providers need to get their customers closer to their network to deliver a better experience. Towers are a vital link in the chain from core data center to edge data center to, ultimately, end users. As such, they have similar needs as edge data centers in terms of capacity, connectivity and redundancy, as well as space, power and cooling. In this context, it's valid to use edge data center infrastructure management best practices as a reference for tower infrastructure management. At the heart of both should be DCIM capabilities, enhanced with cable and telecommunication resource management.

For example, RAN resources at the site must be linked to fronthaul and backhaul connectivity data, configuration data for mobile RAN resources, and operations from mobile RAN to core network. A tower's cabling and connectivity infrastructure must be capable of handling these data flows. For a tower to operate efficiently, it must have physical and logical network inventory to manage site infrastructure such as power and cabling, but also antenna, BBUs, RRUs, routers and OTN devices. From a mobile operations perspective, logical connectivity management is needed both in the fronthaul and backhaul portion of the network. Configuration data must also be managed, including parameters of antenna, parameters of BBUs, RRUs, cells and more. Towercos can take over these types of tasks from their mobile operator tenants, such as RAN configuration management, RAN operations, RAN spare part and repair. In doing so, they help their operator tenants get closer to their users, regardless of where they are or how distant from the core network.

In today's new mobile RAN architectures, the previous long coaxial cable runs are being replaced with fiber optic accompanied by power cables to provide power to the equipment at the tower or rooftop. Cabling is the foundation for the FTTA (Fiber to the Antenna) and C-RAN architecture of

towers and is the backbone of tower tenants' connectivity requests. The FTTA approach used with C-RAN architecture requires enhanced fiber management functionalities to plan, rollout, and operate mobile sites.

As towercos need to connect cable at the site and equipment such as routers and OTN devices with the networks of different operators, cable management will continue to be a challenge due to more technologies being deployed and operator site-sharing making cellular sites more crowded. In addition, dozens of fiber optic and power cables will be running on the sites, increasing the risk of cable damage and the complexity to assure diverse routing requirements. As with edge data centers, redundancy is mandatory and must be managed on both the logical and fiber layers. Towercos must implement software that can manage tower resources from C-RAN and FTTA down to mobile core as well as manage all connections between all network resources regardless of where they reside.

Driving Efficiency with Product and Service Catalogs

The main benefit of a comprehensive management solution is that it provides a rock-solid foundation on which all other processes can reliably run. When you consider that a towerco can manage thousands of sites, with different tenants at each site asking for various products and services, a product and service catalog consisting of different bundles (i.e. space, power, connectivity, etc.); remote hand service is critically important. Such a catalog manages the packages sold to the different tenants efficiently. It provides full transparency of all services offered to tenants inclusive of assigned resources, cost and price over the entire service lifecycle. This catalog-driven approach establishes an efficient, standardized and scalable service delivery chain. Additionally, because such a catalog has modularized components on the back end, it leads to a more structured, accelerated and improved sales process. Given the large volume of tenants a towerco serves, this automation of service delivery is necessary for the commercialization of its various products. This approach is the best way for towercos to future-proof their towers.

Deploying the Right Management Solution

As more and more service providers push the boundaries of their networks, only towers equipped with the right foundation will remain successful. In the era of professional infrastructure-sharing, towercos can drive profitability by focusing on site management and site infrastructure to increase tenancy ratios, improve operational and energy efficiency, and standardize and accelerate 4G and 5G rollouts. To do this, towers not only need a sound infrastructure but also the proper tools to manage tower resources and processes to support these activities. Deploying the right management solution will provide towercos with a full range of capabilities to plan, operate, and manage mobile sites and the infrastructure resources they need to function for both existing networks and those in the future.